Glenn Research Center, Occupational Health Programs Manual

Chapter 21 – HAZARD ASSESSMENT/EXPOSURE ASSESSMENT PROGRAM

NOTE: The current version of this chapter is maintained and approved by the Safety, Health, and Environmental Division (SHED). The creation date of this chapter was March 2007. The current version is located on the Glenn Research Center intranet at http://smad-ext.grc.nasa.gov/emo/pub/ohpm/ohpm-manual.pdf. Approved by: Occupational Health Branch Chief, Gayle Reid

PURPOSE

The objective of the Hazard and Exposure Assessment (HEA) Program is to provide healthful working environments throughout GRC Lewis Field and Plum Brook Station by reviewing potentially hazardous operations and conducting personal and, where appropriate, area monitoring to evaluate worker exposure to hazardous agents. This program also provides guidance on documentation of the potential hazards and a mechanism for prioritizing data collection.

Please note that policies regarding the safe use of and specific regulatory requirements for certain hazardous agents (e.g. lead, asbestos, mercury, bloodborne pathogens, radiation, and noise) are covered in other OHB manual chapters.

APPLICABILITY

This chapter is applicable to all personnel at Glenn and Plum Brook Station, including, but not limited to, civil servants, contractor personnel (construction contract personnel must comply with the contents of this program; however, the contractor is responsible for implementation details such as air monitoring and personal protection equipment), and students.

DEFINITIONS

Action Level – This is the concentration or level of an agent at which it is deemed that some specific action should be taken. In general the action level is set at one half of the adopted occupational exposure limit.

Carcinogen – A substance or agent capable of causing or producing cancer in mammals, including humans. A chemical is considered to be a carcinogen or potential carcinogen if;

a) It has been evaluated by IARC and found to be a carcinogen or potential carcinogen;
b) It is listed as a carcinogen or potential carcinogen in the annual report on carcinogens published by the National Toxicology Program (NTP); or
c) It is regulated by NIOSH or OSHA as a carcinogen.

Disposal – Final placement for destruction of toxic, radioactive or other wastes; surplus or banned pesticides or other chemicals; polluted soils; and drums containing hazardous chemicals from remedial actions or accidental releases.

Engineering Controls – Designing out the hazard by process changes, substitution of harmful chemicals, isolation, ventilation, and source modification.

Occupational Exposure Limit (OEL) – A health-based workplace standard to protect workers from adverse exposure (e.g., PELs, TLVs', WEELs, etc.).

Permissible Exposure Limit (PEL) is OSHA's term that establishes maximum allowable concentrations in air of substances in which nearly all workers may be repeatedly exposed 8 hours a day, 40 hours a week, for 30 years without adverse effects. There are three different categories of PEL's.

- PEL-Ceiling (C) is the limit that cannot be exceeded at anytime during the workshift
- PEL - Short Term Exposure Limit (STEL) is a 15-minute time-weighted average (TWA) exposure that shall not be exceeded at any time during the workday unless another time limit is specified.

- PEL-8-hour TWA is the maximum allowable airborne concentration averaged over an 8-hour period.

Recommended Exposure Limit (REL) – The recommended exposure limit for a substance in air established and published by the National Institute for Occupational Safety and Health (NIOSH).

Sensitizer – A material that is capable of causing an immune (allergic) response in an individual. In most cases, initial exposure results in a normal response, but repeated exposures lead to progressively strong and abnormal responses.

Skin Notation – Denotes the possibility that dermal absorption may be a significant contribution to the overall body burden of the chemical (that is, the airborne OEL may not be adequate to protect the worker because the compound also readily penetrates the skin.

Systemic Effect – Adverse affect that occurs at a site other than at the site of contact.

Target Organs –Organs of the body most affected by exposure to a particular substance.

Threshold Limit Value (TLV) – Established by the American Conference of Governmental Industrial Hygienist (ACGIH) to designate degree of exposure to contaminants and expressed as parts of vapor or gas per million parts of air by volume at 25^{o}C and 760 mmHg pressure, as approximate milligrams of particles per cubic meter of air (mg/m^{3}) or as number of fibers per cubic centimeter of air (f/cc). An exposure level under which it is believed most people can work consistently for 8 hours a day, day after day, with no harmful effects.

Threshold Limit Values (TLVs) are exposure limits recommended by the American Conference of Governmental Industrial Hygienists (ACGIH) under which it is believed that most people can work 8 hours a day, day after day, with no harmful effects. There are three different categories of TLV's. •

- TLV-C is the concentration that should not be exceeded during any part of the working exposure.
- TLV-STEL a 15-minute TWA exposure which should not be exceeded at any time during a workday even if the 8-hour TWA is within the TLV-TWA. Exposures above the TLV-TWA up to the STEL should be < 15 minutes, occur < 4 times/day, and there should be $\geq$ 60 minutes between successive exposures. An averaging period other than 15 minutes may be recommended when warranted.
- TLV-8-hour TWA is the maximum allowable concentration in air of a substance averaged over an 8-hour period.

TWA, 8 hour – Time weighted average concentration to which an employee is exposed over an 8-hour day.

Toxicity – A relative property of a chemical agent that refers to harmful effects on some biologic mechanism and the conditions under which the toxic effect occurs

POLICY

It is GRC's policy to comply with all applicable regulations regarding chemical use and to prevent illness to workers and damage to the environment from the use, removal and disposal of the chemicals. To accomplish this, all personnel must comply with the requirements of this chapter.

It is also NASA's official policy to adhere to OSHA or the American Conference of Governmental Industrial Hygienists (ACGIH) occupational exposure limits (whichever is more restrictive) to ensure worker protection.

This chapter applies to hazardous chemicals (other than those covered in other chapters) that are either currently used or that will be used in the future at GRC.

RESPONSIBILITIES

Occupational Health Branch (Industrial Hygiene)

- Provides guidance on the requirements of Federal, State and local occupational health regulations.
- Reviews SOPs and conducts Hazard Assessments or assists others with conducting them.
- Performs exposure assessments.

- Recommends procedures to minimize exposure.
- Recommends employees for inclusion in a medical surveillance program, when required.
- Maintains the task and exposure database for all related operations.
- Conducts any required training beyond that provided under the Hazard Communication Standard.
- Maintains medical surveillance programs for civil servant and contractor employees exposed to hazardous chemicals that require medical monitoring.

Occupational Health Branch (Technical Services)

- Conducts hazard and assists with exposure assessments.
- Maintains sampling equipment and performs calibrations as needed.
- Enter hazard and exposure assessment into database.

Occupational Health Branch (Medical Services)

- Notifies IH about employees reporting signs and/or symptoms of exposure to toxics

Environmental Management Branch (EMB)

- Provides guidance on the requirements of Federal, State and local environmental regulations.
- Maintains the chemical inventory
- Reviews chemical purchases and notifies OHB when hazardous chemicals or products containing certain regulated chemicals are requested
- Conducts Hazard Communication training
- Provides guidance for handling spill situations. (See EMB Manual Chapter 8 for details).
- Assists in the collection and disposal of regulated chemicals and waste products containing regulated chemicals

Plum Brook Station Management Office (PBMO)

- Identifies hazardous chemicals at Plum Brook Station and develops a compliance program based upon the Occupational Health and Safety Administration requirements in 29 CFR Part 1910.

Organization Development and Training Office

- Establishes and maintains the official training records for GRC civil servants.

Supervisors

- Identify users of hazardous chemicals within the guidelines of this policy and notify an OHB industrial hygienist of the user and the particular material prior to its use.
- Ensure areas where hazardous chemicals are used are properly marked and access is restricted.
- Ensure employees follow good work practices
- Ensure employees meet training requirements

Employees

- Procure chemicals in compliance with Chapter 15 "Acquisition of Hazardous Chemicals and Materials" of the Environmental Programs Manual
- Use the regulated chemicals in accordance with procedures established for safe use of the chemicals.
- Use personal protective equipment as specified in established work procedures.
- Notify medical services and their supervisor if they experience any signs or symptoms of over-exposure.
- Notify their supervisors of any operational changes or new uses of the regulated chemicals.
- Discard waste material through the EMB's waste management operation.
- Attend training when required

REQUIREMENTS

When evaluating the risk of actual or potential exposures to NASA GRC personnel to various hazardous agents, many different sources of information must be reviewed. While a hazard assessment is similar to a Job Hazard Analysis

(JHA), it focuses on occupational health issues rather than on safety ones. The term Hazard Assessment has been generally used to evaluate the use of personal protective equipment (PPE) as required under the OSHA PPE standard.

The sources of information reviewed include, but are not limited to, all of the hazards covered by OHB manual chapters, permits for various processes and experiments, SOP's, purchasing records for chemicals, the chemical inventory, PPE requests, and operations identified by SHED, FD, supervisors, and employees as potentially hazardous.

Once the hazard assessment is complete, exposure monitoring may be scheduled to evaluate actual exposures. This testing may include both personal or area monitoring and is used to document exposure, determine if controls are adequate, and/or determine the level of PPE necessary or required under a particular regulation.

Only those trained will conduct exposure monitoring and employees and their supervisors are expected to cooperate when monitoring is necessary.

RECORDS

OHB

- SOP's
- Hazard and Exposure Assessments and reports
- Hazard/Exposure Assessment Database
- Medical Examinations (Maintained by Occupational Medical Services (OMS)

EMB Maintained

- Chemical Laboratory SOP's
- Chemical Inventory

REFERENCES

- U.S. Department of Labor, Occupational Safety and Health Administration, 29 CFR Part 1910 Subpart Z – Toxic and Hazardous Substances.
- American Conference of Governmental Industrial Hygienists, TLV & BEI book for current year.
- National Institute for Occupational Safety and Health, Criteria Documents and other publications.
- American Industrial Hygiene Association, Workplace Environmental Exposure Limits (WEELs)

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